Moody Creek Monitoring Project

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Developed for: Madison Soil and Water Conservation District
Henry's Fork Watershed Council
Idaho Association of Soil Conservation Districts
Idaho State Department of Agriculture
Department of Environmental Quality, Idaho Falls Regional Office

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INTRODUCTION

The Subbasin Assessment for the Teton River watershed Total Maximum Daily Load (TMDL) analysis is currently out for public comment. Several stream segments have been listed in the TMDL for different pollutants. These pollutants include sediment, nutrients, and temperature. The Madison Soil and Water Conservation District has concerns about Moody Creek, which is located in the lower section of the subbasin. They requested that the Idaho Association of Soil Conservation Districts (IASCD) perform water quality monitoring on Moody Creek to determine sediment and nutrient loads in the subwatershed.

The monitoring of Moody Creek subwatershed will be a coordinated effort with many different agencies. Monitoring will be coordinated for the subwatershed with the Madison Soil and Water Conservation District (SWCD), the Henry's Fork Watershed Council (Watershed Advisory Group), IASCD, Idaho Falls Regional Department of Environmental Quality (IDEQ), and Idaho State Department of Agriculture (ISDA). Along with these agencies, the Natural Resources Conservation Service (NRCS) and Forest Service (USFS) will provide support in reducing pollutants entering Moody Creek.

BACKGROUND

Moody Creek is one of several tributaries in the Teton Subbasin that is listed on the State of Idaho 303(d) list DEQ published in accordance with requirements of Section 303(d) of the Clean Water Act. The Teton River tributaries are primarily listed for sediment and nutrients while Moody Creek is listed for nutrients. IASCD will also conduct monitoring for sediment. The beneficial uses for the Teton River and its tributaries are cold water aquatic life and salmonid spawning. The primary land uses in the subbasin are agriculture and recreation (Hill, 2001).

Moody Creek originates in the Targhee National Forest. Several tributaries, North and South Moody, Browning, Garner, and Fish creeks, flow together to form Moody Creek proper. Moody Creek, below the forest boundary, is a third order stream. Several small, no name streams, enter Moody Creek below the boundary. There are a few miles of state land that Moody Creek flows through, from the forest, before entering private land. Approximately twenty miles after leaving forestland, Moody Creek enters the South Fork of the Teton River.

PROGRAM OBJECTIVES

IASCD will work in cooperation with the above mentioned agencies to complete the following objectives:

- Evaluate the impact of agriculture on Moody Creek.
- Evaluate the water quality and discharge rates on this stream.

- Attempt to determine which areas contribute to the greatest level of loading with respect to TMDL parameters.

- Use this data for public awareness.

MONITORING PROGRAM

This monitoring program will be implemented by IASCD with assistance from ISDA, ISCC, SWCD, NRCS, and DEQ. Other groups may assist in technical support or fieldwork as needed.

There will be a total of three monitoring sites located on Moody Creek. These monitoring sites will be located below the Forest Service boundary. The upper most monitoring site is located on the stream where Woods Crossing is located. The middle site is located above where the stream crosses Pincock Road, and the lowest site (furthest downstream) is located where the stream crosses Moody Road (Figure 1). The Teton and East Teton Canals enter Moody Creek between the middle and lower site.

These sites will be monitored for total suspended solids, total volatile solids, nitrate and nitrite, ammonia, total and ortho phosphorus. Field parameters will be dissolved oxygen, pH, temperature, specific conductance, flow, saturation, and total dissolved solids (Table 1).

The monitoring will take place for one year. Samples will be collected on a bi-weekly schedule beginning in April 2001. Bi-weekly monitoring will continue throughout the summer and into the fall. The monitoring schedule will then switch to monthly for the winter months and early spring. Due to winter conditions, some sites may be difficult to reach or sample.

SAMPLING METHODS

WATER QUALITY

Samples for water quality analyses will be collected by grab sampling directly from the source. The actual sampling sites, within the creeks and drains, will be located far enough upstream to avoid any backwater effects caused by other tributaries entering the stream. For very incised shallow creeks, six one-liter grab samples will be collected from a well-mixed section, near mid-stream at approximately mid-depth. For larger creeks, multiple grab samples will be collected at equal intervals across the stream's cross section to provide a representative sample. For shallow water sites (1 foot deep or less) grab samples will be collected by hand using a clean one-liter stainless steel container. At sites where the water depth is greater than one foot, a DH-81 integrated sampler will be used for water collection. Whichever method is used, individual samples will be collected at equal intervals across the entire width of the drain or creek. Each discrete sample will in turn be composited as mentioned in the following paragraph. The actual location, number of grabs, and sample collection technique will be determined after observing the conditions at each sampling location.

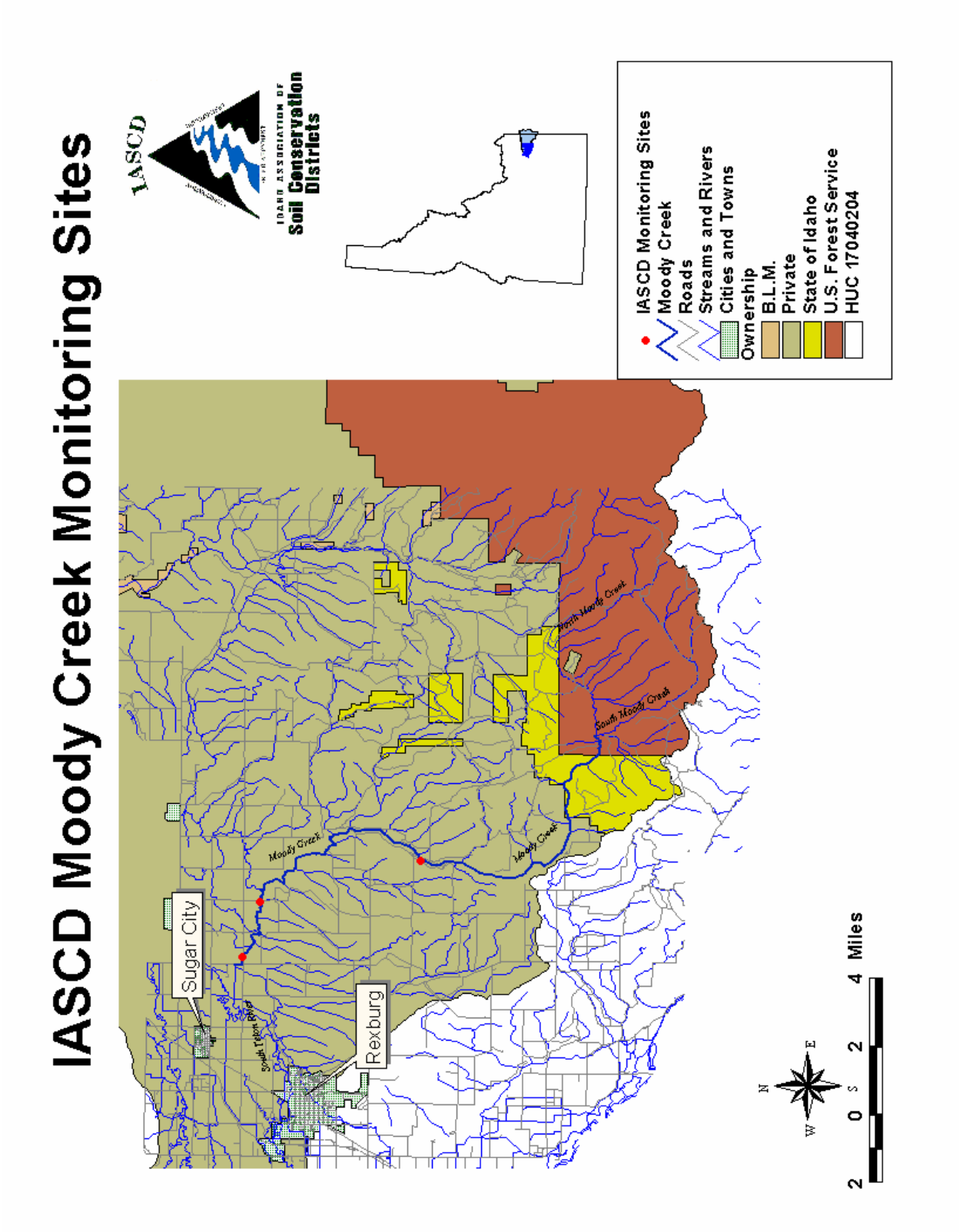

Figure 1. IASCD Monitoring Sites located on Moody Creek HUC 17040204

Each grab sample will be composited into a 2.5-gallon polyethylene churn sample splitter. The resultant composite sample will then be thoroughly homogenized and poured off into properly prepared sample containers. For samples requiring filtration (ortho-phosphorous), a portion of the sample water will be transferred into the filtration unit and pressure filtered though a 0.45µm N-6 Gelman Metricel Filter. The resultant filtrate will be transferred directly into a properly prepared sample bottle. The filtration unit will be thoroughly rinsed with deionized water and equipped with a new 0.45 µm filter at each sampling location. Water for nutrients, that require preservation, will be transferred into preserved (H_2SO_4 pH <2) 500 ml sample containers. The polyethylene churn splitter will be thoroughly rinsed with source water at each location prior to sample collection. Refer to Table 1 for a list of parameters, analytical methods, preservation, and holding times.

TABLE 1. WATER QUALITY PARAMETERS

Parameters	Sample Size	Preservation	Holding Time	Method
Non Filterable Residue (TSS)	200 ml	Cool 4°C	7 Days	EPA 160.2
Volatile Residue (TVS)	200 ml	Cool 4°C	7 Days	EPA 160.4
Nitrogen-nitrate/nitrite	50 ml	Cool 4 °C H_2SO_4 pH<2	28 Days	EPA 300
Ammonia	150 ml	Cool 4 °C H_2SO_4 pH<2	28 days	EPA 350.3
Total Phosphorus	100 ml	Cool 4 °C, H2SO4 pH < 2	28 Days	EPA 365.4
Ortho Phosphorus	100 ml	Filtered , Cool 4°C	24 Hours	EPA 365.2

All sample containers will be equipped with sample labels that will be filled out using water proof markers with the following information: station location, sample identification, date of collection, and time of collection. Clear packing tape will be wrapped around each sample bottle and its label to insure that moisture from the coolers does not cause the loss of sample labels. All resultant samples will be placed within a cooler, on ice, to await shipment to the laboratory. Chain-of-Custody forms will accompany each sample shipment. All samples will be delivered to IAS-EnviroChem in Pocatello, Idaho.

FIELD MEASUREMENTS

At each location, field parameters for dissolved oxygen, specific conductance, pH, temperature, and total dissolved solids will be measured. These measurements will be taken, when possible, from a well-mixed section, near mid-stream at approximately mid-depth. Calibration of all field equipment will be in accordance with the manufacture specifications. Refer to Table 2 for a listing of field measurements, equipment and calibration techniques. Photo points and GPS points will be taken at each monitoring site.

TABLE 2. FIELD MEASUREMENTS

Parameters	Instrument	Calibration
Dissolved Oxygen	YSI Model 55	Ambient air calibration
Temperature	YSI Model 55	Centigrade thermometer
Conductance & TDS	Orion Model 115	Conductance standards
pH	Orion Model 210A	Standard buffer (7,10) bracketing for linearity

All field measurements will be recorded in a bound logbook along with any pertinent observations about the site, including weather conditions, flow rates, personnel on site, or any problems observed that might effect the quality of data.

FLOW MEASUREMENTS

Flow measurements will be made with a Marsh McBirney Flow Mate Model 2000 flow meter. The six-tenth-depth method (0.6 of the total depth below water surface) will be used when the depth of water is less than or equal to three feet. For depths greater than three feet the two-point method (0.2 and 0.8 of the total depth below the water surface) will be employed. At each gauging station, a transect line will be established across the width of the drain/creek at a perpendicular angle to the flow. The mid-section method for computing cross-sectional area along with the velocity-area method will be used for discharge determination. The discharge is computed by summation of the products of the partial areas (partial sections) of the flow cross-sections and the average velocities for each of those sections. This method will be used to calculate cubic feet per second at each of the monitoring stations.

QUALITY ASSURANCE AND QUALITY CONTROL (QA/QC)

The IAS–EnviroChem utilizes EPA approved and validated methods. A method validation process including precision and accuracy performance evaluations and method detection limit studies are required of all of IAS-EnviroChem standard operating procedures. Method performance evaluations include quality control samples, analyzed with a batch to ensure sample data integrity. Internal laboratory spikes and duplicates are all part of IAS EnviroChem's quality assurance program. Laboratory QA/QC results generated from this project can be provided upon request.

QA/QC procedures from the field-sampling portion of this project will consist of duplicates (at 10% of the sample load) along with blank samples (one set per sampling event). The field blanks consist of laboratory grade deionized water, transported to the field, and poured off into prepared sample container. The dissolved phosphorous blank will be collected by filtering

deionized water through the filtration unit and transferring the resultant filtrate into an appropriate sample container. The blank sample is used to determine the integrity of the field teams handling of samples, the condition of the sample containers supplied by the laboratory and the accuracy of the laboratory methods. Duplicates consist of two sets of sample containers filled with the same composite water from the same sampling site. The duplicates are used to determine both field and laboratory precision. The duplicate samples will not be identified as such and will enter the laboratories blindly for analyses. Both the duplicates and blank samples are stored and handled with the normal sample load for shipment to the laboratory.

DATA HANDLING

All of the field data and analytical data generated from each sampling event will be reviewed by IASCD and ISDA staff. Each batch of data from a survey will be reviewed to insure that all necessary observations, measurements, and analytical results have been properly recorded. The analytical results will be reviewed for completeness and quality control results. Any suspected errors will be investigated and resolved if possible. The data will then be stored electronically and made available to any interested entity.

DATA USE

The data collected will be assessed by IASCD and ISDA staff for quality and completeness review. The data will then be available for agencies and individuals upon request. IASCD, ISDA, SCC, and SWCDs will use the data to determine loads of sediment or nutrients. This data would also provide information on where to implement specific BMPs. The monitoring will allow agencies to have background information to develop implementation projects for the TMDL and measure project effectiveness. IASCD staff will be providing updates to the districts, WAG, and others on a periodic basis. IASCD will be producing a report at the conclusion of this project. This data can be used for educational purposes to landowners and can be tied together with biological data from USFS, Idaho Fish & Game or DEQ to provide a larger database.

REFERENCES

Hill, Sheryl. 2001. Draft Teton Subbasin Assessment and Total Maximum Daily Load for Public Comment. Idaho Department of Environmental Quality. Idaho Falls, Idaho.